

U.S.S.N. 10/051,906

Claim Amendments

Please amend claims 1, 11, and 16 as follows.

1. (currently amended) A method for protecting a semiconductor process wafer surface from thermally degraded photoresist to improve a solder ball formation process comprising the steps of:
 - providing a semiconductor process wafer having a process surface comprising an uppermost a passivation layer and an exposed UBM contact layer;
 - forming a protective layer over the uppermost passivation layer and an the exposed UBM contact layer, the protective layer comprising a resinous organic material having a glass transition temperature (Tg) that is about greater than a solder reflow temperature;
 - forming a patterned photoresist layer on the protective layer the patterned photoresist_layer comprising an opening overlying the UBM contact layer;
 - forming a solder column within the opening on the UBM contact layer; and,
 - subjecting the solder column with the patterned photoresist in place to a first reflow temperature.
2. (original) The method of claim 1, wherein the glass transition temperature (Tg) is greater than about 300 degrees Centigrade.

U.S.S.N. 10/051,906

3. (original) The method of claim 1, wherein the protective layer comprises Benzocyclobutene.

4. (previously presented) The method of claim 1, wherein the glass transition temperature (Tg) is greater than about 350 degrees Centigrade.

5. - 7. (cancelled)

8. (previously presented) The method of claim 1, wherein the solder column comprises a lead content of greater than about 90 weight percent.

9. (cancelled)

10. (original) The method of claim 1, wherein the protective layer is removable by at least one of reactive ion etching and wet chemical stripping.

U.S.S.N. 10/061,906

11. (currently amended) An improved method for forming a solder ball to avoid photoresist residue in a solder ball formation process comprising the steps of:

providing a semiconductor wafer process surface comprising an under bump metal (UBM) contact layer for forming a solder bump thereover;

forming a protective layer overlying the semiconductor wafer process surface ~~including comprising~~ the UBM contact layer said protective layer comprising a resinous organic material having a glass transition temperature (Tg) that is greater than a solder reflow temperature;

forming a patterned photoresist layer over the protective layer ~~forming the patterned photoresist layer comprising an opening for containing a solder column overlying the UBM contact layer;~~

removing a portion of the protective layer within the opening to reveal the UBM contact layer;

~~forming the solder column on the UBM contact layer to form a solder column;~~

subjecting the solder column to a first reflow temperature;

removing remaining portions of the protective layer and the photoresist layer; and,

subjecting the solder column to a second reflow temperature to form a solder ball.

U.S.S.N. 10/051,906

12. (original) The method of claim 11, wherein the glass transition temperature (Tg) is greater than about 300 degrees Centigrade.

13. (original) The method of claim 11, wherein the protective layer comprises Benzocyclobutene.

14. (previously presented) The method of claim 11, wherein the glass transition temperature (Tg) is greater than about 350 degrees Centigrade.

15. (original) The method of claim 11, wherein the solder column includes a lead content of greater than about 90 weight percent.

16. (currently amended) The method of claim 11, wherein the UHM contact layer forms an uppermost under bump metal layer (UBM) the UBM layer(s) selected from the group consisting of titanium, copper, and nickel.

17. (original) The method of claim 11, wherein the protective layer is removable by at least one of reactive ion etching and wet chemical stripping.

U.S.S.N. 10/051,906

18. (previously presented) The method of claim 11, wherein the step of removing comprises a wet chemical stripping process.

19. (previously presented) The method of claim 11, wherein the step of providing a semiconductor wafer process comprises depositing a UBM masking photoresist layer over the UBM contact layer followed by reactive ion etching to reveal a passivation layer surrounding the UBM contact layer.

20. (cancelled)

21. (previously presented) The method of claim 1, further comprising the steps of:

removing remaining portions of the protective layer and photoresist layer; and,

subjecting the solder column to a second reflow temperature to form a solder ball.

22. (previously presented) The method of claim 1, wherein an oxygen ashing process is carried out to remove the protective layer at the bottom of the opening to reveal the UBM contact layer prior to the step of forming a solder column.

U.S.S.N. 10/051,906

23. (previously presented) The method of claim 11, wherein the step of removing a portion of the protective layer comprises an oxygen ashing process.

24. (previously presented) The method of claim 11, wherein the passivation layer is selected from the group consisting of silicon nitride and silicon oxido.